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EXAMINER	
MACKOWEY, ANTHONY M	
ART UNIT	**PAPER NUMBER**
2623	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/026,433	ARAKAWA, SATOSHI	
	Examiner	Art Unit	
	Anthony Mackowey	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

The amendment filed July 29, 2005 has been entered and made of record.

Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-21 are rejected under 35 U.S.C. 102(b) as being anticipated by USPN 5,301,107 to Shimura.

Regarding claim 1, Shimura discloses a radiation image signal processing method (col. 1, lines 7-12), comprising the steps of:

i) performing image position correcting processing for correcting a low energy image signal and/or a high energy image signal such that a position of an image, which is represented by the low energy image signal, and a position of an image, which is represented by a the high energy image signal, coincide with each other, a pair of corrected original image signals being thereby obtained (col. 14, lines 52-65; col. 15,

lines 1-14, Shimura teaches position adjustment processing is carried out on the image signals SO1 (low energy image) and SO2 (high energy image) such that the positions of the images coincide with each other.),

ii) performing first energy subtraction processing on the pair of the corrected original image signals (col. 15, lines 15-40; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the bone image signal S1.), and

iii) performing second energy subtraction processing with respect to the low energy image signal and the high energy image signal (col. 15, lines 41-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the soft tissue image signal S2.),

wherein the second energy subtraction processing is performed by the utilization of the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 15, lines 1-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing position adjustment processing and then performing the first and second energy subtraction processing. It is clear the first and second energy subtraction processing are performed using the same pair of position adjusted image signals.).

Regarding claim 2, Shimura discloses the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing,

are stored (col. 18, line 60 – col. 19, line 9, Shimura teaches the image signals are stored in the internal memory.), and

the second energy subtraction processing is performed by the utilization of the pair of the corrected original image signals, which have thus been stored (col. 18, line 60 – col. 19, line 9, Shimura teaches both the first and second energy subtraction processing are performed on the image signals stored in the internal memory.).

Regarding claim 3, Although Shimura does not explicitly recite the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing, are transferred to a certain destination, and the second energy subtraction processing is performed at the transfer destination by the utilization of the pair of the corrected original image signals, which have thus been transferred. Shimura teaches the image processing is performed on an apparatus including a CPU, floppy disk drive, CRT display and internal memory (Fig. 11; col. 14, lines 28-37), which clearly describe a conventional computer. Shimura clearly teaches the signals are stored in the internal memory (col. 18, line 60 – col. 19, line 9). Transferring data between the internal memory and the CPU for processing is inherent to the functionality of a conventional computer, thus transferring the corrected image signals from the internal memory to a transfer destination (CPU) for energy subtraction processing is inherent to the system and method taught by Shimura.

Regarding claim 4, Shimura discloses the image position correcting processing is performed on only the high energy image signal (col. 15, lines 1-14, The reference in essence allows either one to be corrected with respect to the other signal, thus meeting the limitation.).

Regarding claim 5, Shimura discloses a radiation image signal processing apparatus (Fig. 11) wherein:

i) image position correcting processing is performed for correcting a low energy image signal and/or a high energy image signal such that a position of an image, which is represented by the low energy image signal, and a position of an image, which is represented by a the high energy image signal, coincide with each other, a pair of corrected original image signals being thereby obtained (col. 14, lines 52-65; col. 15, lines 1-14, Shimura teaches position adjustment processing is carried out on the image signals SO1 (low energy image) and SO2 (high energy image) such that the positions of the images coincide with each other.),

ii) first energy subtraction processing is performed on the pair of the corrected original image signals (col. 15, lines 15-40; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the bone image signal S1.), and

iii) second energy subtraction processing is performed with respect to the low energy image signal and the high energy image signal (col. 15, lines 41-54; Fig. 6, col.

19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing energy subtraction to produce the soft tissue image signal S2.),

the second energy subtraction processing being performed by the utilization of the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 15, lines 1-54; Fig. 6, col. 19, lines 3-9; Fig. 9, col. 23, lines 17-39, Shimura teaches performing position adjustment processing and then performing the first and second energy subtraction processing. It is clear the first and second energy subtraction processing are performed using the same pair of position adjusted image signals.).

Regarding claim 6, Shimura further discloses the apparatus comprises:

a) common energy subtraction processing means for performing the first energy subtraction processing and the second energy subtraction processing (Fig. 11, col. 14, line 17- col. 15, line 50, Shimura discloses an image processing and display apparatus (computer) for performing first and second energy subtraction processing.),

b) storage means for storing the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing (col. 14, lines 17-37, col. 18, line 60 – col. 19, line 9, Shimura teaches the apparatus contains internal memory.),

c) instruction means for outputting an instruction for performing the second energy subtraction processing (Although not explicitly reciting an instruction means, the processing and display apparatus taught by Shimura is clearly a conventional computer

(Fig. 11; col. 14, lines 17-37). Instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.), and

d) control means for controlling the common energy subtraction processing means in accordance with the instruction, which has been outputted from the instruction means, such that the common energy subtraction processing means performs the second energy subtraction processing by the utilization of the pair of the corrected original image signals, which have been stored in the storage means (col. 14, lines 17-37, Shimura teaches the image processing and display apparatus includes a CPU.).

Regarding claim 7, Shimura further discloses the apparatus comprises:

a) first energy subtraction processing means for performing the first energy subtraction processing (Fig. 11, col. 14, lines 17- col. 15, line 35), Shimura discloses an image processing and display apparatus (computer) for performing the first energy subtraction processing.),

b) second energy subtraction processing means for performing the second energy subtraction processing (Fig. 11, col. 14, lines 17- col. 15, line 50, Shimura teaches an image processing and display apparatus for performing the second energy subtraction processing. Current claim language does not exclude the first and second energy subtraction processing means from being the same.),

c) storage means for storing the pair of the corrected original image signals,

which have been obtained at the time of the first energy subtraction processing (col. 14, lines 17-37, col. 18, line 60 – col. 19, line 9, Shimura teaches the image processing and display apparatus contains internal memory.),

d) instruction means for outputting an instruction for performing the second energy subtraction processing (Although not explicitly reciting an instruction means, the processing and display apparatus taught by Shimura is clearly a conventional computer (Fig. 11; col. 14, lines 17-37). Instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.), and

e) control means for controlling the second energy subtraction processing means in accordance with the instruction, which has been outputted from the instruction means, such that the second energy subtraction processing means performs the second energy subtraction processing by the utilization of the pair of the corrected original image signals, which have been stored in the storage means (col. 14, lines 17-37, Shimura teaches the image processing and display apparatus includes a CPU.).

Regarding claim 8, Shimura further discloses the apparatus comprises:

a) first energy subtraction processing means for performing the first energy subtraction processing (Fig. 11, col. 14, lines 17- col. 15, line 35), Shimura discloses an image processing and display apparatus (computer) for performing the first energy subtraction processing.),

b) second energy subtraction processing means for performing the second energy subtraction processing (Fig. 11, col. 14, lines 17- col. 15, line 50, Shimura teaches an image processing and display apparatus for performing the second energy subtraction processing. Current claim language does not exclude the first and second energy subtraction processing means from being the same.),

c) instruction means for outputting an instruction for performing the second energy subtraction processing (Although not explicitly reciting an instruction means, the processing and display apparatus taught by Shimura is clearly a conventional computer (Fig. 11; col. 14, lines 17-37). Instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.), and

d) control means for transferring the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing, to the second energy subtraction processing means, and controlling the second energy subtraction processing means in accordance with the instruction, which has been outputted from the instruction means, such that the second energy subtraction processing means performs the second energy subtraction processing by the utilization of the pair of the corrected original image signals, which have thus been transferred (col. 14, lines 17-37, Shimura teaches the image processing and display apparatus includes a CPU.). Shimura teaches the image processing is performed on an apparatus including a CPU, floppy disk drive, CRT display and internal memory (Fig. 11; col. 14,

lines 28-37), which clearly describe a conventional computer. Shimura clearly teaches the signals are stored in the internal memory (col. 18, line 60 – col. 19, line 9). Transferring data between the internal memory and the CPU for processing is inherent to the functionality of a conventional computer, thus the control means for transferring the pair of the corrected original image signals from the internal memory to the processor for energy subtraction processing is inherent to the system taught by Shimura.

Regarding claim 9, Shimura further discloses the image position correcting processing is performed on only the high energy image signal (col. 15, lines 1-14, The reference in essence allows either one to be corrected with respect to the other signal, thus meeting the limitation.).

Regarding claim 10, Shimura further discloses the first energy subtraction processing is performed by a first energy subtraction processing means, and wherein the second energy subtraction processing is performed by a second energy subtraction processing means (col. 14, line 17 – col. 15, line 50, Claim language does not explicitly recite that the first and second energy subtraction processing means necessarily be different.).

Regarding claim 11, Shimura further discloses the image position correcting processing is performed by an image position correcting means which receives the low

energy image signal and the high energy image signal from a buffer memory which temporarily stores the low energy image signal and the high energy image signal (col. 14, lines 17 – col. 15, line 14, Shimura teaches the first and second image signals are stored in the internal memory and then position adjustment processing is carried out.).

Regarding claim 12, Shimura further discloses the buffer memory receives the low energy image signal and the high energy image signal from a radiation image recording and readout apparatus (Fig. 11, col. 13, line 33 – col. 14, line 51, Shimura teaches the first and second X-ray images have been stored on stimulable phosphor sheets which are exposed to a laser beam and emit light. The emitted light is converted to electric signals that are sampled and amplified to form the first and second image signals.).

Regarding claim 13, Shimura further discloses an image position correcting means outputs the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing to a storage means (col. 15, lines 1-14; col. 18, line 60 – col. 19, line 9).

Shimura does not explicitly recite the pair of the corrected original image signals are transferred from the storage means to a common energy subtraction processing means when an instruction means outputs an instruction to a control means which controls the common energy subtraction processing means such that the common energy subtraction processing means performs the second energy subtraction

processing by the utilization of the pair of the corrected original image signals. However, Shimura teaches the image processing is performed on an apparatus including a CPU, floppy disk drive, CRT display and internal memory (Fig. 11; col. 14, lines 28-37), which clearly describe a conventional computer. Shimura clearly teaches the signals are stored in the internal memory (col. 18, line 60 – col. 19, line 9). Transferring data between the internal memory and the CPU for processing is inherent to the functionality of a conventional computer, thus transferring the pair of the corrected original image signals from the internal memory to the processor for energy subtraction processing is inherent to the system taught by Shimura. Also, instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means outputting instructions to a control means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.).

Regarding claim 14, Shimura further discloses the transfer destination is a common energy subtraction processing means, and

wherein the first energy subtraction processing and the second energy subtraction processing is performed by the common energy subtraction processing means (Fig. 11, col. 14, line 28 – col. 15, line 50, The same image processing and display apparatus performs both the first and second energy subtraction processing.).

Regarding claim 15, Shimura further discloses the image position correcting processing is performed by an image position correcting means which receives the low

energy image signal and the high energy image signal from a buffer memory which temporarily stores the low energy image signal and the high energy image signal (col. 14, lines 17 – col. 15, line 14, Shimura teaches the first and second image signals are stored in the internal memory and then position adjustment processing is carried out.).

Regarding claim 16, Shimura further discloses the buffer memory receives the low energy image signal and the high energy image signal from a radiation image recording and read-out apparatus (Fig. 11, col. 13, line 33 – col. 14, line 51, Shimura teaches the first and second X-ray images have been stored on stimulable phosphor sheets which are exposed to a laser beam and emit light. The emitted light is converted to electric signals that are sampled and amplified to form the first and second image signals.).

Regarding claim 17, Shimura further discloses an image position correcting means output the pair of the corrected original image signals, which have been obtained at the time of the first energy subtraction processing to a storage means (col. 15, lines 1-14; col. 18, line 60 – col. 19, line 9), and

Shimura does not explicitly recite the pair of the corrected original image signals are transferred from the storage means to a common energy subtraction processing means when an instruction means outputs an instruction to a control means which controls the common energy subtraction processing means such that the common energy subtraction processing means performs the second energy subtraction

processing by the utilization of the pair of the corrected original image signals. However, Shimura teaches the image processing is performed on an apparatus including a CPU, floppy disk drive, CRT display and internal memory (Fig. 11; col. 14, lines 28-37), which clearly describe a conventional computer. Shimura clearly teaches the signals are stored in the internal memory (col. 18, line 60 – col. 19, line 9). Transferring data between the internal memory and the CPU for processing is inherent to the functionality of a conventional computer, thus transferring the pair of the corrected original image signals from the internal memory to the processor for energy subtraction processing is inherent to the system taught by Shimura. Also, instructions such as software programs are inherent to the functionality of conventional computers and thus an instruction means outputting instructions to a control means for performing the energy subtraction processing is inherent to the apparatus taught by Shimura.).

Regarding claim 18, Shimura further discloses an image position correcting means outputs the pair of the corrected original image signals, which have been stored in the storage means to the common energy subtraction processing means for performing the second energy subtraction processing (Fig. 11; col. 14, line 28 – col. 15, line 50; col. 18, line 60 – col. 19, line 9, Shimura teaches position adjustment of the image signals and the same image processing and display apparatus performs both the first and second energy subtraction processing using the image signals stored in the internal memory.).

Regarding claim 19, Shimura further discloses an image position correcting means outputs the pair of the corrected original image signals to the common energy subtraction processing means for performing the first energy subtraction processing (Fig. 11; col. 14, line 28 – col. 15, line 50, Shimura teaches position adjustment of the image signals and the same image processing and display apparatus performs both the first and second energy subtraction processing using the image signals.).

Regarding claim 20, wherein a buffer memory receives the low energy image signal and the high energy image signal from a radiation image recording and read-out apparatus (Fig. 11, col. 13, line 33 – col. 14, line 51, Shimura teaches the first and second X-ray images have been stored on stimulable phosphor sheets which are exposed to a laser beam and emit light. The emitted light is converted to electric signals that are sampled and amplified to form the first and second image signals.), and

wherein the buffer memory outputs the low energy image signal and the high energy image signal to an image position correcting means which performs the image position correcting processing (col. 14, line 66 – col. 15, line 14, Shimura teaches the image signals are read from the internal memory and position adjustment processing is carried out.).

Regarding claim 21, Shimura further discloses an image position correcting means outputs the pair of the corrected original image signals to a storage means, and to the first energy subtraction processing means generates an energy subtraction image

signal by utilizing the pair of the corrected original image signals received from the image position correcting means (col. 15, lines 1-35; col. 18, line 60 – col. 19, line 9, Shimura discloses image position adjustment processing and performing energy subtraction using the first and second image signals stored in the internal memory.).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimura.

Regarding claim 22, Shimura does not disclose an image position correcting means outputs the pair of the corrected original image signals to a signal transfer cable, the signal transfer cable transfers the pair of the corrected original image signals to a filing device which stores the pair of the corrected original image signals. The Examiner takes Official Notice that signal transfer cables and filing devices (an example being a hard disk drive), are well known in the art of image processing utilizing computers such as the apparatus taught by Shimura. Signal transfer cables such as those connecting a hard disk drive to the other components of the computer are well known and would have been obvious to one of ordinary skill in the art in order to store the images on a hard

disk drive providing safe and stable storage as well providing as a large storage capacity which may be needed for large images of X-ray images such as those produced by the invention of Shimura.

Regarding claim 23, Shimura the buffer memory outputs the pair of the corrected original image signals to the second energy subtraction processing means which generates an energy subtraction image signal by utilizing the pair of the corrected original image signals (col. 18, line 60 – col. 19, line 9).

Shimura does not disclose filing device output the pair of the corrected original image signals to a signal transfer cable which transfers the pair of the corrected original image signals to a buffer memory. The Examiner takes Official Notice that signal transfer cables and filing devices (an example being a hard disk drive), are well known in the art of image processing utilizing computers such as the apparatus taught by Shimura. Signal transfer cables such as those connecting a hard disk drive to the memory of a computer are well known and would have been obvious to one of ordinary skill in the art in as storage on the hard disk drive provides safe and stable storage as well providing as a large storage capacity thus reducing the amount of buffer memory required as it only needs to store images currently to be processed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

USPN 4,482,918 to Keyes et al. is cited for teaching temporal energy subtraction.

USPN 4,710,875 to Nakajima et al. is cited for teaching alignment for radiation images undergoing subtraction processing.

USPN 4,792,900 to Sones et al. is cited for teaching subtracting high and low energy radiographic images to obtain both bone and soft tissue images.

USPN 4,868,857 to Dobbins, III is cited for teaching a dual-energy imaging system in which the images are aligned before processing.

USPN 5,315,507 to Nakajima et al. is cited for teaching energy subtraction of radiation images with superposition processing.

USPN 5,633,509 to Takeo is cited for teaching energy subtraction processing with position adjustment.

USPN 5,884,005 to Peters is cited for teaching an image information storage and retrieval unit for displaying X-ray images.

USPN 6,529,757 to Patel et al. is cited for teaching a picture archiving system.

USPAP 2001/0007593 to Oosawa is cited for teaching temporal image subtraction, image registration and a data base server.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Mackowey whose telephone number is (571) 272-7425. The examiner can normally be reached on M-F 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AM
10/17/2005

JINGGE WU
PRIMARY EXAMINER